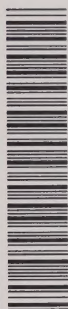


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Energy in Ontario 1973

Table of Contents

Page 22

E N E R G Y

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1973

Ministry of Energy

56 Wellesley St. West

Toronto, Ontario

Canada



## Energy in Ontario 1973

### Table of Contents

	<u>Page No.</u>
Highlights .....	1
Primary Energy Consumption in Ontario .....	2
By Source in Percent - Figure 1 ...	3
By Source in BTU - Figure 2 ...	4
Annual Percent Increases - Table 1 ...	5
By Source in BTU 1969 - 1973 - Figure 3 ...	6
Oil in Ontario .....	7
Oil Balance Sheet - Table 2 ...	8
Canadian Oil Requirements - Table 3 ...	9
Sources of Refined Products - Table 4 ...	12
Sales of Products - Table 5 ...	13
Oil Refinery Capacities - Table 6 ...	16
Natural Gas in Ontario .....	20
Gas Balance Sheet - Table 7 ...	21
Sales by Category - Table 8 ...	23
Propane in Ontario .....	27
Propane Receipts and Disposition - Table 9 ...	28
Pipelines in Ontario .....	29
Pipeline Mileage - Table 10 ..	30
Coal in Ontario .....	33
Coal Balance Sheet - Table 11 ..	34
Electricity in Ontario .....	38
Electric Energy Balance - Table 12 ..	39



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## ONTARIO ENERGY HIGHLIGHTS 1973

The outstanding 1973 energy development was the remarkable operating success of the Pickering generating plant as the major commercially proven cornerstone of Ontario's expanding nuclear power programme.

Another highlight was the Middle East countries' embargo on their oil exports and the resulting supply gap in Quebec and Eastern Ontario being met with oil from Western Canada.

Consumption of energy rose at a lower rate and nearly all forms of energy were more costly. Oil continued as the major supply source. Electricity increased with higher thermal generation using more uranium and natural gas. Rising demand for petrochemicals is pushing up needs for crude oil and natural gas as feedstocks.

Crude oil supplies from Western Canada and refinery output were higher. Petroleum product transfers from other provinces and imported decreased and exports rose. Crude imports were up and Ontario oil production declined.

Receipts of natural gas from Western Canada increased. Withdrawals from storage decreased and injections rose while Ontario gas well output dropped.

Less coal was imported from the U.S.A. about half being used for generating electricity. Relatively minor coal supplies from other provinces decreased.





## PRIMARY ENERGY CONSUMPTION IN ONTARIO 1973

Ontario consumption of supplies of primary energy reflected the shifting trend in their use from prior years. Lower rates of increases in some major types of energy were accompanied by decreases in others and a continued rise in nuclear. The charts and tables herewith show the extent of and changes in use of primary energy on a heat-equivalent basis.

Total primary energy consumed was about  $2,732 \times 10^{12}$  BTU representing a 3 percent increase down from an 8 percent advance. Decreased industrial use of some major energy types caused this change.

Oil followed by natural gas, electricity and coal provided the bulk of needs. Oil retained its position as the major source although with little change in rate of increase. Natural gas had a much lower advance due to less industrial consumption. Coal use decreased notably with an eased contribution to total energy but continued as an important thermal fuel despite a sharp upswing in nuclear.

Electricity had the highest use increase with an advanced rate of thermally-generated supply mainly from the Pickering nuclear plant more than doubling its output. A decrease in hydro-electricity was off from a major increase.





Figure 1

Primary Energy Consumption By Source  
As Percent Of Total Consumption For 1973

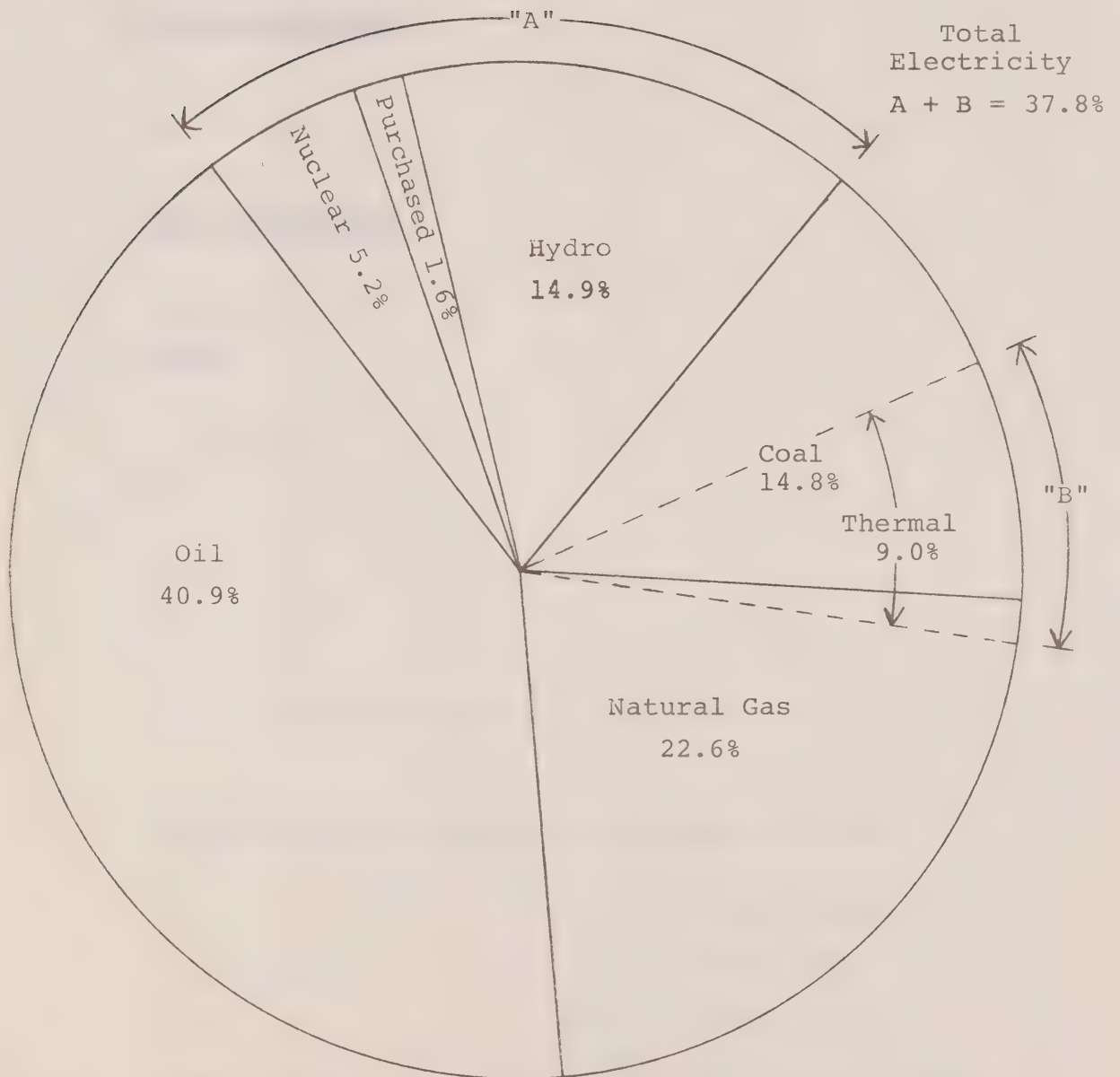






Figure 2

Primary Energy Consumption in Ontario - 1973



Conversion Factors for Primary Energy Sources

Oil	$5.8 \times 10^6$ BTU/barrel
Natural Gas	$1.0 \times 10^6$ BTU/Mcf
Coal	$26.2 \times 10^6$ BTU/ton
Electricity	10,000 BTU/ kilowatt Hour





Table 1

Ontario Energy Consumption Annual Percent Increases

	<u>1973</u>	<u>1972</u>	<u>1971</u>
Oil	4.0	3.5	0.6
Natural Gas	3.8	20.3	12.3
Coal	-13.4	3.3	-9.9
Electricity:			
Hydro	-1.4	8.0	-2.5
Nuclear	2.3 times	57.1	4.0 times
Purchases	5.1	-5.9	-22.0
TOTAL ENERGY	3.0	8.2	0.8





Figure 3

ENERGY CONSUMPTION IN ONTARIO 1969 - 1973

HEAT EQUIVALENT IN B.T.U.

10<sup>12</sup> BTU

3,000

2,000

Total

1,000

Oil

Total  
Electricity

Coal  
Hydro Elec.  
Natural Gas

Conventional  
Thermal  
200 Elec.

100

50

Purchased  
Elec.

Nuclear  
Elec.

1969

1970

1971

1972

1973





## OIL IN ONTARIO

### General

Significant features of Ontario's 1973 oil industry ranged from increased receipts from Western Canada, refinery output and consumption, to endangered security of imported supplies from imposition by Arab warring nations of an embargo against Eastern Canada and other consuming countries. Other developments were shipments of western oil into Quebec to offset decreasing imports, growing needs of the petrochemical industry for oil as feedstock, and conservation measures to protect declining domestic oil reserves in the face of mounting demand.

A higher rate of refinery output accompanied the larger crude supplies which continued to provide about 40 percent of Ontario's energy needs. Oil product transfers from other provinces and imported were down and exports up. The relatively minor volumes of crude oil imports increased and production from Ontario wells declined. Prices of Western Canada crude and refined products advanced along with products moved into Eastern Ontario from Quebec where refined from increasingly higher priced imports.

### Crude Oil

Crude oil supplies from Western Canada rose 10 percent over 1972 and accounted for nearly half of that marketed in Canada. By source provinces, Alberta deliveries increased



Table 2

Ontario Oil Balance 1973 (1)

		Quantities in Thousands of Barrels	Percent of Total	Percent Change over 1972
<u>Supply</u>				
Crude Oil	- Ontario Production	808	0.4	-8.0
(2)	- From Western Provinces	153,648	75.9	12.5
	- Imports from Venezuela	490	0.2	15.6
	- Net Transfers and other Materials	-4,683	-2.3	0
	- Total Run to Stills	150,263	74.2	9.9
Products	- Transfers from Other Provinces	39,746	19.6	-2.4
	- Imports	5,513	2.7	-16.2
	- Other Receipts	6,804	3.4	43.2
	- Total Product Receipts	52,063	25.7	0
Total Supply		202,326	100.0	7.2
<u>Disposition</u>				
Consumption	- Customer Sales	181,708	89.8	3.6
	- Company Use	10,064	5.0	7.8
	- Total Consumption	191,772	94.8	3.8
Other	- Transfers to Other Provinces	4,764	2.4	35.3
	- Exports	4,656	2.3	40.5
	- Product Inventory Changes	120		0
	- Losses	1,014	0.5	61.2
	Total Other Disposition	10,554	5.2	2.7 times
Total Disposition		202,326	100.0	7.2

(1) Based on Statistics Canada Monthly Report No. 45-004.

(2) Crude Oil, condensate and pentanes plus, comingled propane and butane mixes.





Table 3

Canadian Oil Requirements in Percent of Total for 1973

	<u>Ontario</u>	<u>Prairies &amp; N.W.T.</u>	<u>Quebec &amp; Maritimes</u>	<u>B.C.</u>	<u>Total</u>
Crude Receipts					
Canadian	24.8	15.7	1.0	8.5	50.0
Imported	0.1	-	51.7	-	51.8
Total	24.9	15.7	52.7	8.5	101.8
Net Product Imports	0.1	0	-1.3	0.7	-0.5
Provincial Transfers (1)	6.0	-1.1	-7.0	0.8	-1.3
Total Consumption	31.0	14.6	44.4	10.0	100.0

(1) Product Transfers between provinces plus other materials to stills plus inventory changes.





about 20 percent to nearly 80 percent of total receipts, while Saskatchewan and Manitoba dropped 12 and 30 percent respectively and accounted for around 20 and one percent of the total. Crude oil from Venezuela rose 15 percent during a four month supply period while native Ontario production dropped 8 percent together providing about one percent of total needs.

A major development was the shipment of Western Canada oil to Eastern Canada authorized by the federal government to offset expected shortages in oil imports from an embargo by oil exporting Arab countries against the U.S.A. and other nations felt to be favouring Israel in the Middle East War. This measure involved waiving the National Oil Policy (NOP) which had reserved markets west of the Ottawa Valley NOP Line for Western oil, and Eastern Ontario to the Atlantic for off-shore or imported oil. Commencing around August, crude oil was shipped via the St. Lawrence Seaway and from Western Canada through Vancouver and the Panama Canal. By the year end when receipts from the Middle East were decreasing, over 5 million barrels had been moved into Eastern Canada mainly Quebec and these transfers continued into the new year. About the same time, a products line extending eastwards from Kingston was reopened to allow supplies refined from Western crude to move into Ottawa and other eastern Ontario markets.

Western crude prices advanced about \$1.00 a barrel followed by year-end indications of more advances being considered. By



marked contrast, prices of imported crude rose sharply by New Year's Day quadrupling 1972's along with reportedly more increases to come.

#### Refined Petroleum Products

Ontario oil refineries had a 10 percent output increase up notably from a minor decline mainly due to capacity additions during the year. Ontario's rise compared with Canada's and continued at 24 percent of national refinery output.

Net product transfers especially from Quebec dropped 6 percent off from a 3 percent rise and along with refinery production supplied over 90 percent of oil needs. In comparing sources of major products, motor gasoline had the highest refinery output ratio to consumption and decreased dependance upon transfers from other provinces while light oil showed less transfers and heavy had more. Although these oils reflected lower refinery ratios, light and heavy increases of 3 and 6 percent respectively were up sharply from corresponding decreases of 9 and 6 percent. Motor gasoline and these two oils accounted for the major bulk of net transfers.

Product imports declined 16 percent compared with an all-Canada 25 percent drop and were a marked change from a 50 percent increase. Exports rose 40 percent following higher mid-year advances compared with a 60 percent hike. Ontario imports and exports continued at 14 and 11 percent respectively of





Table 4

Sources of Three Significant and All Petroleum Products 1973  
Expressed as Percentages of Consumption and Changes over 1972

	Motor Gasoline		Light Fuel Oil		Heavy Fuel Oil		All Products	
	Consumption	Percent Change over 1972	Consumption	Percent Change over 1972	Consumption	Percent Change over 1972	Consumption	Percent Change over 1972
Refinery Production	81.1	5.9	66.1	3.1	60.6	6.0	77.9	10.0
Transfers								
Interprovincial In	13.0	-0.8	18.8	-11.4	38.7	2.5	20.6	-2.4
Out	1.6	2.1 times	1.9	3.8 times	0.3	-74.2	2.5	35.3
Net	11.4	-7.5	16.9	-18.4	38.4	5.3	18.1	-6.0
Interproduct	2.1	4.0 times	17.8	54.8	3.5	83.6	-0-	
Inventory (net)	2.2	-0-	-2.7	-0-	-1.4	-0-	-0-	
Imports:	-	-50.6	0.9	-77.7	6.7	5.6	2.9	-16.2
Less Exports	0.4	4.6 times	2.1	28.6	8.2	36.5	2.4	40.5
Net Imports	-0.4	-0-	-1.2	-0-	-1.5	-0-	0.5	-0-



Table 5

Ontario Net Sales of Petroleum Products 1973 (1)

	<u>Quantities in Thousand Barrels</u>	<u>Percent of Total</u>
Propane (2)	1,249	0.7
Butane & Butane Mixes	1	-
Petro-chemical Feed Stock	7,566	4.2
Naptha Specialties	1,780	1.0
Aviation Gasoline	290	0.1
Motor Gasoline	74,114	40.8
Aviation Turbo Fuel	5,769	3.2
Kerosene, Stove Oil, Tractor Fuel	2,629	1.4
Diesel Fuel Oil	14,030	7.7
Light Fuel Oil (Nos. 2 & 3)	38,099	21.0
Heavy Fuel Oil (Nos. 4, 5 & 6)	27,333	15.0
Asphalt	5,421	3.0
Coke	298	0.2
Lubricating Oil & Grease	2,631	1.4
Other Products	498	0.3
	<hr/>	<hr/>
Total All Products	181,708	100.0
	<hr/>	<hr/>

(1) Based on data from Statistics Canada Monthly Report No. 45-004.

(2) Represents Ontario refinery production from crude oil only.





Canada's totals.

Sales of refined products maintained a 4 percent growth to about 500,000 barrels a day representing 30 percent of Canada's total. Of four major products comprising 80 percent of sales, motor gasoline increased 9 percent from a 6 percent rise, light fuel oil dropped 8 percent from a 4 percent advance, heavy oil was up two percent from a 4 percent decline, and diesel oil rose 15 percent from a 6 percent increase.

Product selling prices generally followed the higher prices of domestic and imported crude. Prices of motor gasoline and fuel oils increased about 5 cents a gallon in Ontario and 8 cents in Montreal and other parts of Quebec. The federal government instituted a voluntary freeze on prices in the early Fall whereby oil companies were to request permission before making any further increases. The freeze is to be removed early in 1974 when Western crude prices could rise to around \$6.50 a barrel which reportedly approximates the net cost of imported oil into Eastern Canada after importers are paid the federal government tax levied on exports to the U.S.A. Around the same time, product price increases are expected to approach 10 cents a gallon west of the Ottawa Valley and 4 cents eastwards.

The possibility of shortages from stretching out domestic oil supplies to offset lower imports resulted in development of suggested methods to economize on energy. Consumers were en-



couraged to restrict use and avoid possible waste in a variety of ways such as reducing road speeds and limiting vehicle operation to save on gasoline, lowering of thermostats and improving insulation to reduce fuel oil use and many others.

#### Current and Future Developments

Vulnerability of part of Ontario's oil supply to adverse international events was accentuated by the Middle East countries' embargo and the need to provide more domestic oil supplies to replace reduced imports. This development also emphasized the importance of continuing additions to the province's refinery capability to meet growing demands of expanding industrial and other oil consuming markets and to an even greater extent for expected future needs.

Ontario refinery capacity increased 20,000 barrels per day (bpd) as in 1972. Construction of BP Canada's 40,000 bpd addition to double its Trafalgar plant progressed to installation of major components by the year end with completion expected by late 1974. Sun Oil's doubling its Sarnia plant to 80,000 bpd was almost finished. Gulf Oil plans a 25,000 bpd addition to its Clarkson refinery to be completed early 1975. Capacity of Texaco's Port Credit refinery was increased 4,000 to 46,000 bpd while construction of its 95,000 bpd plant at Nanticoke is expected to commence in early 1974 with an expected total cost of \$400 million up notably from earlier estimates of \$200 million. 1974 refinery plans for Quebec include sub-





Table 6

ONTARIO REFINING CAPACITY 1973

Primary Distillation Capacity at Year End  
in Thousands of Barrels per Calendar Day.

Shell:	Oakville	42.0
	Corunna	72.0
Gulf:	Clarkson	61.5
B.P.:	Trafalgar	42.0
Imperial:	Sarnia	130.0
Texaco:	Port Credit	46.0
Sun Oil:	Sarnia	38.0
		<hr/>
Total Ontario - Thousands B/CD		431.5
- as percent of Total Canada		25
(Total Quebec - as percent of Total Canada		33 )



stantial additions to capacity and storage to provide in part for Eastern Ontario markets.

Oil from Montreal East refineries to fuel the Bruce heavy water steam plant at Douglas Point was transported in 63-car unit trains which made 87 trips and carried over two million barrels by the year end.

Construction of the Lennox oil-fired thermal generating station near Kingston progressed materially with erection of three main oil-storage tanks among other developments. When completed, it may be the first of its size in North America to function on either bunker or crude oil. Source of supplies reportedly will be imported oil transported by unit-train from the Quebec City area.

Significant growth in the petrochemical industry which produces chemicals for processing into gasoline additives, industrial liquids, plastics, fabrics and other synthetics may substantially push up demand for crude oil as feedstock. Ontario's productive capacity reportedly is about half of Canada's total. While natural gas provides a major portion of Ontario needs, its significant future consumption as a feedstock appears to be centreing in Western Canada. Of major projects to expand Ontario's capacity, one proposed to increase the extensive Sarnia facilities would require about 170,000 barrels a day of western crude oil and represent a notable addition to consumption.





Imports from the Middle East apparently will continue to cause problems of cost and possibly supply affecting the 20 percent of Ontario's refined products made in Quebec from imported crude which, in turn, provides 30 percent of Eastern Canada's supply. The Organization of Petroleum Exporting Countries (OPEC) of which the Middle East, Venezuela and other major oil exporting countries are members has developed a strong position in the international oil market by the increased proportion of state control acquired over major oil firms' holdings in those countries especially during the past couple of years. Production can be increased or reduced for conservation or other purposes which, in the Middle East, affects about half of the world reserves. While some Middle East countries may be less secure oil sources, Venezuela almost consistently has provided about 50 percent of Canada's imports although at equally higher prices. Under such conditions of supply and cost, other potential sources of energy become more attractive especially those within Canada's boundaries.

The Athabasca tar sands area is to be the scene of large future plants of the 100,000 bpd range to extract synthetic oil from the estimated 300 billion barrels of recoverable reserves located in northern Alberta. The 65,000 bpd Great Canadian Oil Sands facility north of Fort McMurray is the only operating plant at present and produced about 17 million barrels during the year. Early in 1974, Syncrude of Canada plans to begin construction of a 125,000 bpd plant for completion in 1978. Around the same time, Petrofina and Shell Canada is to request Alberta government permission to build one plant each of the



100,000 bpd size while at least one other major oil company was planning a similar facility.

Another hydrocarbon source for development are the heavy oil deposits in the Cold Lake area of northern Alberta estimated to contain about 30 billion barrels of recoverable oil. Following extensive research over many years, techniques for producing major volumes from these reserves apparently have been developed and are being utilized in an on-site recovery plant.





## NATURAL GAS IN ONTARIO

### General

Natural gas consumption in Ontario increased 4 percent compared with 1972's 20 percent rise. Receipts from Western Canada were higher while imports from and exports to the U.S.A. decreased. Injections into storage advanced and withdrawals declined. More gas was used for thermal generation of electricity. Higher prices were charged for Western production and reflected in increased costs to Ontario consumers.

Exploration in Western Canada was higher but a major part of the small addition to gas reserves was ethane which may continue to be produced mainly for petrochemical feedstock. The vast potential of the Far North gas reserves are attracting increased attention with major pipeline projects under consideration.

### Supplies

Gas received from Western Canada rose 14 percent easing from an 18 percent increase. Imports from the U.S.A. decreased 4 percent over an 8 percent advance. Exports fell about 25 percent maintaining the declining trend of the previous two years, with less through the Cornwall and Fort Frances areas and none through Niagara Falls since early 1972.

Use of gas mainly in compression equipment dropped 8 per-



Table 7

Ontario Natural Gas Balance 1973

	<u>Thousands Cubic Feet*</u>	<u>Percent of Total</u>	<u>Change over 1972</u>
<u>Supply</u>			
Ontario production	9,528,102	1.4	-23.0
Receipts from			
Western Canada	653,785,536	96.4	14.3
U.S.A.	<u>14,735,562</u>	2.2	-4.5
	668,521,098		
Propane Air	<u>26,240</u>	-	3.6 times
Total Supply	678,075,440	100.0	10.8
<u>Disposition</u>			
Sales to consumers	579,363,928	85.4	4.8
House Gas	26,681		-16.0
Company Use	<u>30,491,423</u>	4.5	-8.1
	30,518,104		
Total Consumption	609,882,032	89.9	4.1
Gas to Storage (net)	42,788,735	6.3	-
Gas to Province of Quebec (net)	1,347,671	0.2	70.7
Exports to U.S.A.	13,444,612	2.0	-24.2
Metering, Line Loss & other Unaccounted for	<u>10,612,390</u>	1.6	-
	68,193,408		
Total Disposition	678,075,440	100.0	10.8

\* at 14.73 psia





cent notably down from a 25 percent rise and accounted for about 5 percent of Western Canada supplies.

Native Ontario natural gas output again dropped 20 percent with Lake Erie providing two-thirds and the lower total providing about one percent of total needs.

### Storage

Operations of natural gas storage pools reflected the eased demand rate. Withdrawals dropped 25 percent during the first and final quarters of the year's peak demand winter periods. Deposits into storage during the summer injection period rose 40 percent, such greater use having been provided for by substantial additions to capacity through conversion of former producing wells over the past couple of years.

### Sales

Sales of natural gas to Ontario consumers rose 5 percent off sharply from a 20 percent advance while maintaining a level approaching 50 percent of sales in Canada.

Consumption by residential users was down almost 5 percent compared with an 11 percent rise, although the number of users increased to a similar extent. While there were 9 percent more commercial customers, their consumption was only 3 percent higher notably off from a 20 percent advance. Residential and commercial sales together maintained their 40 percent ratio of



Table 8

Natural Gas Sales in Ontario 1973

Comparative Totals by Consumers Categories

Quantities in Thousands Cubic Feet

<u>Category of Consumer</u>	<u>Percent Changes 1973</u>					
	<u>over 1972</u>		<u>over 1968</u>			
	<u>Number of Consumers</u>	<u>Quantities</u>	<u>Number of Consumers</u>	<u>Quantities</u>	<u>Number of Consumers</u>	<u>Quantities</u>
Residential	846,422	111,919,028	4.5	-4.5	22.4	22.1
Commercial	86,333	117,030,949	8.7	2.9	38.0	2.0 times
Industrial	11,201	350,413,951	17.4	8.9	49.6	2.2 times
TOTALS	943,956	579,363,928	5.0	4.8	23.9	88.0



total sales.

Industrial consumers were 17 percent greater compared with a minor change. By comparison, a 9 percent increase in industrial use was down significantly from a 23 percent rise and while accounting for 60 percent of sales was the major cause of the year's lower rate of increase in total sales. Use of gas in thermal generation of electricity was 9 percent higher and maintained an 11 percent ratio of industrial sales. Preliminary 1974 information reflected an up-swing in industrial consumption including increased thermal generation use.

#### Other Developments

A significant development was the increased wellhead price of natural gas in Western Canada raising the cost to TransCanada PipeLines from November to 26 cents per Mcf (thousand cubic feet) compared to a previous 16 cent average with indications of more advances under consideration. Major Ontario gas distributors were authorized to raise their rates to consumers by about 10 cents per Mcf and must again request Ontario government permission for any future increases.

Production of gas in Alberta increased around 6 percent but stepped-up exploration activities resulted in a relatively small addition to reserves. Industry experts reportedly estimate that considerable reserves exist in the less accessible and more costly foothill regions and could be developed if





higher return on investment and other incentives would be realized for exploration and development.

The Canadian frontier regions of the Arctic reportedly contain huge reserves of natural gas and their development is at a stage where the method of transportation must be decided. Of the major projects to bring these energy supplies southward to the major consuming markets, the Canadian Arctic Gas Pipeline proposal is the most extensive with an estimated total cost of around \$6 billion. Time for completion of this project is subject to the necessary government approvals but could be around 1980.

Improved demand for petrochemicals may require more natural gas as feedstocks. To meet increasing needs for the important ethane element in gas for feedstock, the Alberta government included ethane with production for the first time in determining 1973 additions to gas reserves. The future extent of this use of natural gas is reflected in the world scale size of one plant completed in Alberta and others planned there for producing fertilizers, methanol and other synthetic materials. Another firm was awaiting government permission to build a plant in Alberta to remove ethane from natural gas and construct a pipeline for carrying it and other hydrocarbons to Sarnia.

The high rates of consumption of natural gas and other



hydrocarbon resources over the past few years necessitated that conservation measures be taken to protect remaining reserves until alternate source of energy can be developed. Among other methods of saving energy, the fuel cell is approaching final stages after nine years of development to produce on-site electricity for lighting, heating and other needs for residential and other buildings. Using natural gas or other liquid petroleum fuels, fuel cells consume less, are more efficient and non-polluting. At present, research is toward achieving smaller units at lower cost for practicable use by home owners.

The relatively non-polluting feature of natural gas also is a prime factor in current experiments with dual-fuelled vehicles which can be operated on gasoline or natural gas. Using compressed natural gas, a dual-fuel vehicle is estimated to reduce pollutants about 80 percent compared with gasoline and to have a longer engine and parts life. At present, this system is suitable only for firms operating fleets of vehicles because of the need for installing a system for compressing gas and so requiring that testing programmes be carried out by a gas utility as Consumers Gas and Union Gas Cos. or closely therewith. No commercial refuelling facilities are available at present for private vehicles. Some Canadian firms using dual-fuel vehicles are Bell Canada, Hudson's Bay Co. and Canadian Western Natural Gas Co., while the California Highways Division is converting its entire fleet of nearly 30,000 units to this system.





## PROPANE IN ONTARIO

Supplies of propane from Western Canada natural gas processing plants eased while that from Ontario oil refineries rose reversing respectively 1972's increase and decrease. Sales by distributors fell compared to an advance while transfers to the petro-chemical industry were higher.

Decreased receipts and sales reflected possibly eased demand and reduced propane's small contribution to total energy supply.

Development of salt dome reservoirs for storing propane continued from preceding years to augment facilities of the extensive hydrocarbon industry in the Sarnia region of southwestern Ontario.

Propane's use for heating, petrochemicals, industrial and other applications may be expanded to utilize its relatively non-polluting content as a motive fuel for fleet vehicles. Like compressed natural gas, a dual-fuel vehicle burning propane emits minor exhaust pollutants and engine maintenance costs are low. Propane's one advantage over compressed gas reportedly is that more effective fuel can be stored in smaller tanks. Present high conversion costs makes the changeover uneconomic for ordinary motorists. A number of trucks in Western Canada have been converted to use propane and by utilizing larger tanks it may become economic for long-haul trucking fleets.



Table 9

Propane Receipts and Disposition in Ontario (1)

1973

In Barrels

		<u>Percent</u>	
	Volumes	Total	Change 1973/72
<u>SUPPLY</u>			
Refinery production	1,961,165	48.7	2.3
Interprovincial transfers IN	2,307,991	57.3	-8.0
OUT	<u>106,706</u>	<u>      </u>	<u>      </u>
Net transfers	2,201,285	54.7	-11.7
Inventory changes	<u>-15,368</u>	<u>-0.4</u>	
Net Canadian Supply	4,147,082	103.0	-4.7
Imports	3,547		14.0
Less Exports	<u>125,244</u>		88.8
Net Imports	<u>-121,697</u>	<u>-3.0</u>	
TOTAL SUPPLY	4,025,385	100.0	-7.2
<u>DISPOSITION</u>			
Petro-chemical and Industrial	582,853	14.5	8.1
Distributors (2)	<u>3,100,636</u>	<u>77.0</u>	<u>-14.2</u>
Sub-Total	3,683,489	91.5	-11.3
Plant and refinery use	15,689	0.4	
Losses or gains	4,438		
Adjustments	<u>321,769</u>	<u>8.1</u>	
TOTAL DISPOSITION	4,025,385	100.0	-7.2

Note (1) Based on Statistics Canada No. 57-002.

(2) Identifiable industrial sales are included. Distributor sales may contain sales to industrial.



## PIPELINES IN ONTARIO

Ontario's extensive network of pipelines for carrying hydrocarbons from Western Canada and to distribution points throughout the province increased but at a reduced rate. All-Canada's 1973 pipeline construction generally was the lowest since the late 1960's.

An important pipeline development to offset shortages in oil imports from the Middle East embargo was to re-open part of a products line which had been closed under the National Oil Policy to prevent movement of Western Canada oil into Eastern Ontario and Quebec markets. A 50 mile sector of the Trans-Northern line extending from near Kingston to Prescott was reactivated and carrying Western oil to Ottawa around the year end.

### Natural Gas Pipelines

Natural gas pipelines in Ontario were about one-third of Canada's total. The major bulk of new distribution line construction of about 600 miles was in Southern Ontario. The increased transmission mileage to 5,461 partly was due to one firm converting about 700 miles of former distribution lines during the year with resultant net increases of 6 and 4 percent respectively in each type of line. A further transmission addition was about 350 miles to the TransCanada PipeLines looping program in Northern Ontario along with compressor station ex-





Table 10

Pipeline Mileage in Ontario - 1973

	<u>Miles</u>	<u>Percent Increases 1973/1972</u>
<u>Natural Gas Pipelines</u>		
Gathering	1,109	-0-
Transmission	5,461	6.4
Distribution	16,451	4.1
	<hr/>	<hr/>
Total	23,021	4.5
 <u>Oil Pipelines</u>		
Crude Oil Trunk Lines	443	6.7
Oil Product Lines	850	Nil
	<hr/>	<hr/>
Total	1,293	1.8
 Total All Pipelines	 24,314	 4.4
	<hr/>	<hr/>



pansion at 3 locations in that region, and 36 miles on its Toronto-Montreal main line with a new compressor station at Cornwall.

TransCanada's 1974 plans are to complete looping over 150 miles of its Northern Ontario sector, a further 69 miles on the Toronto-Montreal line, 17 miles more on its Ottawa extension and 40 miles of small additions at various points in Southern Ontario.

### Oil Pipelines

Interprovincial Pipe Line Ltd added 28 miles to its trunk line system to complete a second link between Sarnia and Oakville along with more pumping and tankage facilities. Their principal 1974 plans include a 520 mile extension from Sarnia to Montreal currently under application to the National Energy Board. This sector will consist of looping approximately half of its existing line from Sarnia to Port Credit and new line for the remainder. Other Interprovincial 1974 projects are additions to pumping station capacities, new stations at 16 locations and nearly 2 million barrels of new tankage.

Sun-Canadian Pipeline's looping of 94 miles of its main products line between Sarnia and Toronto was completed early 1974. Other plans for the coming year are a 30 mile extension of this line from Oakville to a north-central point of Metropolitan Toronto along with a new pumping station there and



additional capacity at 5 other stations.

#### Natural Gas Liquids Pipelines

Dome Petroleum constructed an 82 mile natural gas liquids line from Sarnia to Windsor for completion shortly after the year end. This line for exporting liquids is the Ontario sector of a 1,600 mile project to bring them from Western Canada and is under application to the National Energy Board.





## COAL IN ONTARIO

### General

Ontario consumption of coal decreased during the year. Lower imports provided for most of demand while receipts from other provinces also declined. Less than 50 percent of supply was used for generating electricity and the bulk of the remainder for steel-making and other industrial purposes. Although demand eased over the past couple of years, indications are that coal will continue to be an important part of the province's industrial energy needs especially for Ontario Hydro's fossil fuel-nuclear power plant mix to meet mounting demands for electricity.

### Supply and Consumption

Bituminous coal imports and demand both decreased over 10 percent compared with 1972's advances of 5 and 3 percent respectively. Year-end supplies on hand were slightly higher.

Western Canada bituminous receipts dropped over 50 percent compared with a 30 percent increase. A decrease of 30 percent in Saskatchewan lignite mainly used to generate electricity in Northwestern Ontario further caused the 45 percent drop in western coal supplies. Other decreases were nearly 75 percent in Nova Scotia bituminous and 20 percent in imported anthracite.

Industrial use was down 13 percent continuing a similar



Table 11

## ONTARIO COAL BALANCE 1973

(In thousands of short tons,  
rounded to the nearest 1000)

					1973
					Percent Change from 1972
					Total
					(1) Bitumi- nous
					Anthra- cite
					Lignite
					Total
<u>SUPPLY</u>					
Domestic: Western Provines	-	21	23	44	-45.0
Nova Scotia	-	4	-	4	-73.3
Total		25	23	48	-49.5
Imports: U.S.A.	79	15,683	-	15,762	-11.3
Total Coal Supply	79	15,708	23	15,810	-11.5
<u>DEMAND</u>					
Industrial: Consumption (2)	73	8,045	41	8,159	-13.3
Net to Inventory (3)	-6	351	-17	328	-63.3
Total Demand	67	8,396	24	8,487	-17.6
Other (4): Total Demand	12	7,312	-1	7,323	-3.1
Total Coal Demand	79	15,708	23	15,810	-11.5

(1) Includes sub-bituminous in negligible quantities.

(2) Industrial includes electric utilities, mining and manufacturing.

(3) Excludes stocks held by firms using less than 1000 tons per year  
and stocks held by coke producers.(4) Retail to residential, commercial and small industrial users including  
railway, ship bunker, government and institutional consumption.

Source: Statistics Canada Catalogue No. 45-002.



decrease. A like decline in thermal generation use to about 7 million tons reduced its share of total electricity to 25 from 30 percent. Some inroads on coal's past dominance in thermal use have been made by such other fuels as natural gas and, particularly, uranium used in the successful Pickering power plant.

Ontario's only known native coal resources, the Onakawana lignite deposits of about 145 million tons southwest of James Bay, continued to attract attention with completion of preliminary technical studies of their potential for supporting a thermal generating plant in that region. Further research is needed to assess the economic feasibility of this project, along with environmental and other significant matters such as future requirements for a plant of this type.

#### Future Developments

Increasing demand for energy is expected to result in more coal being used for future thermal generation of electricity. The price of imported coal continued its rising trend from 1970 while reported supply shortages from increasing electric utility demand especially along the U.S. East Coast required imports into that region from Europe. However, natural gas and oil are becoming more costly and available Canadian supplies have been tightening. Ontario Hydro concluded a long-term agreement for the entire output of a new mine to be opened in Pennsylvania which is expected to reach 3 million tons annually





by 1979 and supply about 15 percent of Hydro's coal needs.

An increasing number of coal gasification projects are under way in the U.S.A. as natural gas shortages continue to rise and this development could spill over into Canada where western coal could be used for this purpose. Although pollution control measures still restrict burning of coal for thermal generation and other uses, research is being maintained to further improve techniques for removing sulphur and other pollutants, while the U.S.A. reportedly considered reducing pollution standards because of their limiting effects on measures being taken to offset increasing energy shortages.

Western Canada's extensive coal reserves are estimated to be adequate to meet domestic demand for some time, but the higher cost of transporting up to 1,900 miles from Alberta to Ontario compared with about 450 miles from the furthest U.S. mine source makes western coal uneconomic at present especially for thermal generation. However, sample quantities of western bituminous with sulphur content lower than imports are being tested in some Ontario thermal plants to assess suitability for this use. Plans include moving 500,000 tons by rail to Thunder Bay and then by ship to Southern Ontario to study possible transport economics, and supporting demands on the federal government to lower railway freight charges from Western Canada. Continuation of the sharply higher rates of price increases of imported coal over the past few months com-



pared with those of 1970-1972, especially if accompanied by lower freight charges in Canada, could reach the point where delivered costs of imports in Ontario are comparable with western coal and enable its use to supplement imports.

Interprovincial Pipe Line Ltd. is studying a project whereby coal pulverized in the West could be mixed with crude oil for delivery to thermal plants along its existing pipeline route to Eastern Canada. This "slurry" or mix would be refined in Eastern Canada by removing the bulk of the oil and the remaining coal-oil blend burned for generating electricity. This idea is another version of solids pipelines now operating in some areas of the U.S.A. where crushed coal is mixed with water and transported to delivery points at which water is removed and the coal is ready for use.



## ELECTRICITY IN ONTARIO

### General

Ontario's electricity supply rose 6 percent mainly from the successful Pickering nuclear plant. Hydro-electricity was off and conventional thermal declined with less coal use. Increased supplies were received from other provinces. Significant output from the new Bruce heavy water plant at Douglas Point eased shortages in this essential ingredient of the province's nuclear plants.

Provision for the substantial estimated increases in future electric energy requirements are reflected in plans to double the Pickering and new Bruce generating capacities, for a new nuclear plant near Bowmanville, add more units to the Bruce heavy water plant, an oil-fired station at Wesleyville, and a thermal plant in the Lakehead area.

### Supply

A significant achievement of the province's nuclear power programme was realized in May when Pickering's fourth 540 MW\* nuclear generating unit reached full power. During the year, Pickering attained the highest output capability of all Ontario Hydro generating stations and reportedly produced more electricity than any other nuclear power plant in the world. As a result,

\* 1 megawatt (MW) = 1,000 kw = 1 million watts





Table 12  
Electric Energy Balance 1973

	Ontario (1)		HEPCO (2)
	Billions (10 <sup>9</sup> )kwh	Percent Change over 1972	Billions (10 <sup>9</sup> )kwh
<u>Supply</u>			
Utilities Generation - Hydro	38.9	( -1.8)	36.9
- Thermal			
Conventional	22.7	(-12.4)	22.7
Nuclear	14.2	( 2.3 times)	14.2
- Total	75.8	( 5.7)	73.8
Industry Generation - Hydro	1.7	( 6.3)	-
- Thermal	1.9	( 26.7)	-
- Total	3.6	( 16.1)	-
Total Generation - Hydro	40.6	( -1.5)	36.9
- Thermal			
Conventional	24.6	(-10.6)	22.7
Nuclear	14.2	( 2.3 times)	14.2
- Total	79.4	( 6.1)	
Net Purchases <sup>3</sup>	4.3	( 7.5)	4.4
Total Supply	83.7	( 6.2)	78.2
<u>Disposition</u>			
Sales - Industrial	32.3	( 6.5)	
- Commercial	11.8	( 10.3)	
- Domestic & Farm	17.6	0	
- Street Lighting	0.5	( 25.0)	
- Total Sales	62.2	( 7.0)	
Own Plant Use	7.7	( 4.0)	
Unallocated and Distribution by Non-respondents	13.8	( 3.8)	
Total Disposition	83.7	( 6.2)	

(1) Statistics Canada No. 57-001.

(2) Hydro-Electric Power Commission of Ontario.

(3) Other Provinces and U.S.A. only; excludes transfers within Ontario.



nuclear's share of total generation pushed up to 18 percent from 8 percent with early 1974 indications of this trend to continue.

Hydro declined nearly two percent while supplying half of the total generated. Conventional thermal provided a further 30 percent but dropped 10 percent with coal use down 13 and natural gas up 9 percent. Transfers from other provinces rose about 20 percent imports decreased and exports were higher. Consumption increased 6 percent off from an 8 percent advance.

Two more 500 MW units of the coal-fired Nanticoke generating station (g.s.) near Port Dover were brought into operation with construction of the further 4 units on schedule. Substantial progress was made in building the oil-fired Lennox g.s. near Kingston towards its planned in-service date of early 1975. Proposed is an oil-fired 2,000 MW g.s. at Wesleyville near Port Hope, two 150 MW fossil fueled units at the present Thunder Bay thermal plant to be followed by four 200 MW units at a new location in the Lakehead area.

Adverse ground conditions near the hydro-electric power plant being built at Arnprior necessitated reduction of capacity to 78 MW from 87 MW originally planned.

Anticipated fuel shortages combined with garbage disposal problems stimulated a new "Watts from Waste" recycling project to be tried over a two year period starting late 1976 at the



coal-fired Lakeview g.s. One boiler would be converted to consume 500 tons of processed garbage a day and if successful other boilers will be changed over later.

### Nuclear Power Plants

Ontario's nuclear power capabilities featured notable developments during the year. Pickering supplied the bulk of nuclear generation complemented by the smaller output of Douglas Point g.s. and the Nuclear Power Demonstration Unit at Rolphton near Chalk River. Pickering's output of 13.5 million kwh more than doubled 1972's. Following initial output from unit No. 4, this station operated on a 91.5 percent capacity factor peaking to 95 percent in the 1973-74 winter. During the year, Pickering's unique on-power fuelling capability enabled over 10,000 nuclear fuel bundles being changed.

Installation of major equipment for the first of 4 units of the 3,200 MW Bruce nuclear g.s. was completed towards expected 1976 start-up with each of the remaining 3 units to be added in succeeding years. It is planned to build four more nuclear units at both the Pickering and Bruce sites and a further 3,000 MW nuclear g.s. at Darlington near Bowmanville.

### Heavy Water

The first reactor grade heavy water was produced at the new Bruce 800-ton-a-year heavy water plant in April. The adjacent steam supply unit for this plant was fuelled by oil





carried by unit-trains from Montreal. Ontario Hydro purchased the Bruce plant from Atomic Energy of Canada Ltd (AECL) and operates it as part of its expanding nuclear system.

Tightness in heavy water supply continued from preceding years but by November sufficient quantities were made available for all Ontario nuclear plants to operate simultaneously. By agreement with Ontario Hydro, AECL manages a Heavy Water Pool to which all heavy water produced at Bruce, purchased from the Canadian General Electric at Port Hawkesbuty, Nova Scotia, imported from the U.S.A., Britain, Russia and elsewhere are consigned and used to meet needs of Ontario Hydro reactors and those under contract with AECL. It is planned to build a second 800 ton heavy water plant at Bruce and to design future units of 1,600 ton size.

Reconstruction of the 400-ton-a-year plant at Glace Bay, Nova Scotia, progressed with the main power and water treatment systems expected to be ready early in the year with overall completion by December 1974.

AECL is to construct an 800-ton-a-year heavy water plant at Gentilly near Three Rivers, Quebec, in the vicinity of the present 600 MW g.s. unit to which a second unit of the same size is to be added and produce first power by 1979.

#### Uranium

Production of uranium in Ontario of around 8 million



pounds declined 9 percent from previous years' increases and continued to account for about 80 percent of the all-Canada total. While estimated available Ontario reserves in similar proportion to Canada's total reportedly are sufficient to meet current contracted requirements, present rates of production will have to be increased substantially to provide for expanding future needs as planned new nuclear power plants approach completion.

A further demand upon reserves is the added export commitment of the 40 million pound uranium sale by an Ontario producer to a Japanese utility awaiting federal government approval by the year end. Another export increase may arise with the lifting of the U.S. embargo against uranium imports from Canada within the near future. Because of the urgency to increase reserves and the long time interval between locating and getting new reserves into production, the federal government increased its uranium research program and supplied funding to Eldorado Nuclear, a crown agency, to attract and encourage the mining industry to apply its expertise in more active participation to explore and develop new uranium sources. While Canadian requirements will have priority, the substantial export market developed by industry would be continued as an essential complement to that of the growing nuclear plant components manufacturing industry.



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